



# **NASA Cost Estimating Initiatives**


**2<sup>nd</sup> NASA Project Management Challenge Conference  
University of Maryland  
March 22-23, 2005**

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# 2004 GAO Report on NASA Cost Estimating

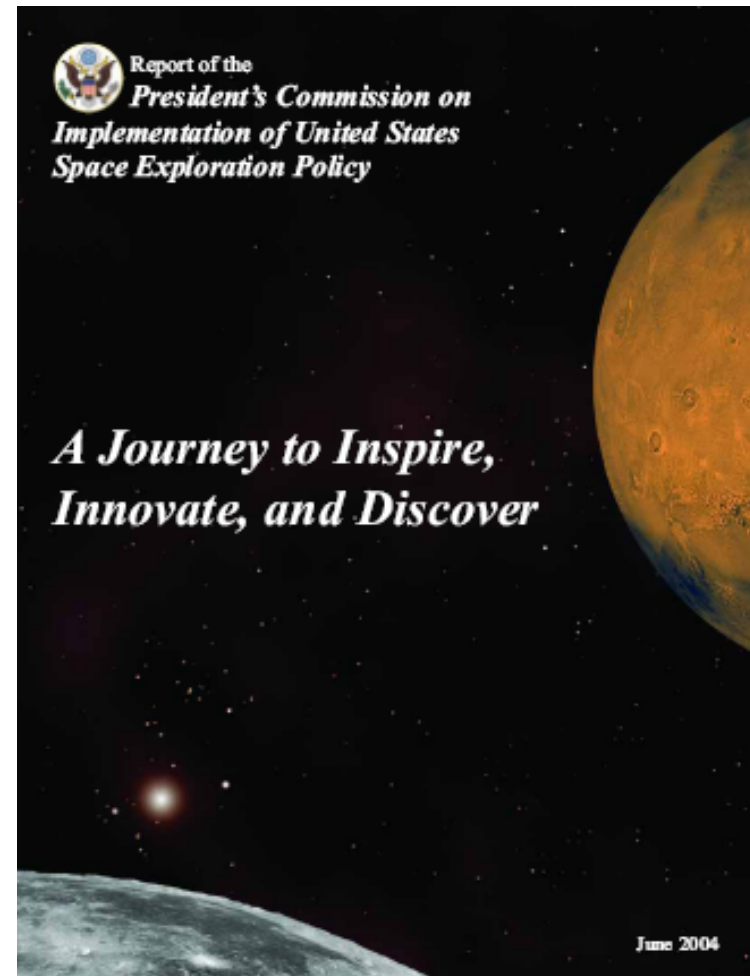
- **1992 GAO study of NASA cost analysis**
  - 29 projects; median cost growth of 77%
- **2004 GAO study**
  - 27 projects; median cost growth of 13%
- **2004 GAO recommendations**
  - Develop an integrated plan including
    - Guidance for rebaselining
    - Enforced use of EVM
    - Staff and support for cost-estimating and EVM
  - Establish a standard framework for LCCEs
    - Based on a full LCC
    - Using a WBS encompassing both in-house and contractor efforts
    - Using CARs
    - With ICEs at each milestone
    - Using cost risk assessments
  - Prohibit projects from proceeding through the review and approval process without above

GAO	United States General Accounting Office Report to the Subcommittee on Space and Aeronautics, Committee on Science, House of Representatives
May 2004	NASA
DRAFT	Lack of Disciplined Cost-Estimating Processes Undermines NASA's Ability to Effectively Manage Its Programs
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GAO-04-642	



# 2004 Aldridge Commission Recommendations On NASA Cost Estimating

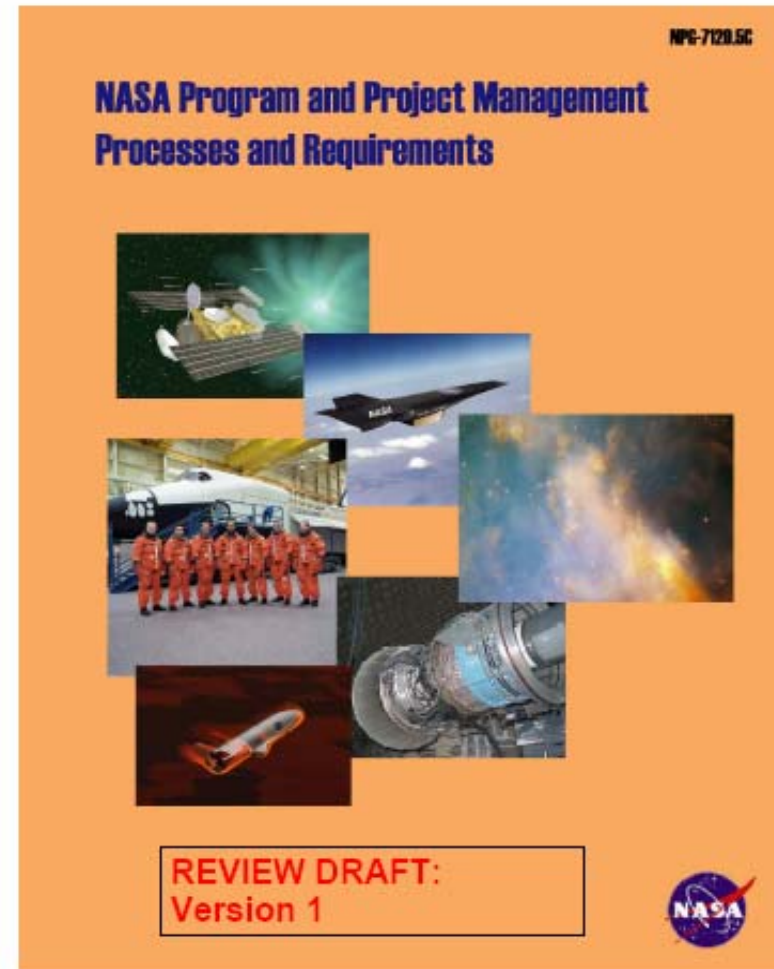
- Recommended an independent cost analysis organization similar to DoD CAIGs (Cost Analysis Improvement Group)
  - Independent cost estimating organization
  - Maintains corporate data base of historical project cost information
  - Generally uses parametric cost estimating procedures
  - Recommends final cost position to approving bodies





# NPR 7120.5C

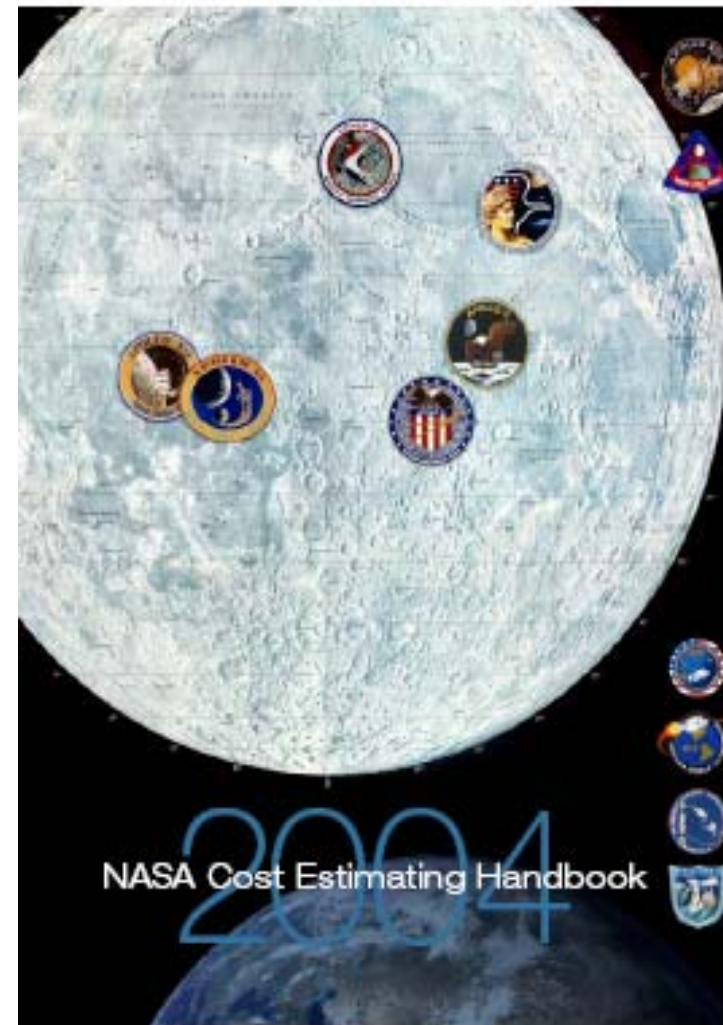
- **Independent Cost Estimates performed at:**
  - End of Phase A (Preliminary Non-Advocate Review (p-NAR))
  - End of Phase B (NAR)
  - Surveillance reviews thereafter
  - Seamless independent assessment method by Office of the Chief Engineer and Office of the Chief Financial Officer
    - Center Systems Management Offices (SMOs)
  - Cost estimating
    - HQ Cost Analysis Division
    - Independent Program Assessment Office (IPAO) Cost Group
    - Center independent cost groups
    - Outside experts, SETAs, FFRDCs, consultants





# 2004 NASA Cost Estimating Handbook

- ▶ **Completely revised since 2002 Edition**
- ▶ **Purpose and Objectives**
  - To provide a best practices resource
  - Tied closely to NPR 7120.5C
- ▶ **Scope**
  - Approaches broad cost-estimating topics through general concept discussions and generic processes, techniques, and tool descriptions
  - Introduces Continuous Cost Risk Management (CCRM)
- ▶ **A living document with revisions on the web at [www.ceh.nasa.gov](http://www.ceh.nasa.gov)**

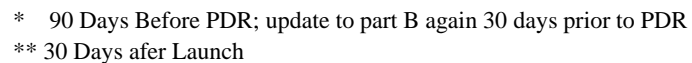




# Cost Initiatives

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- **Initiatives to improve Agency cost estimating are documented in the new NASA Cost Estimating Handbook ([www.ceh.nasa.gov](http://www.ceh.nasa.gov))**
- **These initiatives will be required by NPD 7120.5C**
  - The Deputy Administrator signed a directive on 23 December 2004 immediately implementing the initiatives (prior to NPR 7120.5C release)
- **The initiatives include**
  - Use of Continuous Cost Risk Management to improve coordination across cost communities of practice (estimating, EVM, project management, procurement, etc.)
  - The use of cost risk analysis to quantify uncertainty
  - Better cost data collection using a Cost Analysis Data Requirement (CADRe)
  - A corporate cost data base-the One NASA Cost Engineering (ONCE) database
  - Standardization of work breakdown structures
  - Other related initiatives







# Proposed CADRe Data Collection Process

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- **Project Manager responsible for compiling CADRe data**
- **Data format and submission method per DRD**
  - Format (suggested)
    - Word (Part A)
    - PowerPoint (Part A)
    - Excel spreadsheet (Part B/C)
    - Etc.
  - Data to be submitted via
    - Email
    - CD Rom
    - Upload via portal website





# Cost Initiative Implementation Plan

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- **Phase 1**

- Workshops at the Centers to cover ONCE data base, CADRe and the Common WBS
- Define requirements
- Review current formats for ONCE, CADRe, WBS
- February-March 2005

- **Phase 2**

- Overview at the Centers of NPR 7120.5C by OCFO Cost Analysis Division and Office of Chief Engineer
- Detailed CCRM briefing by Cost Analysis Division
- April 2005?

- **Phase 3**

- Detailed CCRM 2 day training seminar at the Centers
- May-September 2005



## **Supporting Information**



# Continuous Cost-Risk Management

- A cost management architecture providing:

- Identification of medium- and high-risk WBS elements, their assessment & cost impact quantification in the LCCE
- Communication of identified risk WBS elements to project managers for focused cost management
- Post-cost estimate tracking of identified risk WBS element cost and schedule performance using EVM system
- Annual LCCEs for measuring cost-risk reduction
- Updates, collection and archiving of technical and cost data for cost model improvement

*Incorporated in  
NPG 7120.5C*



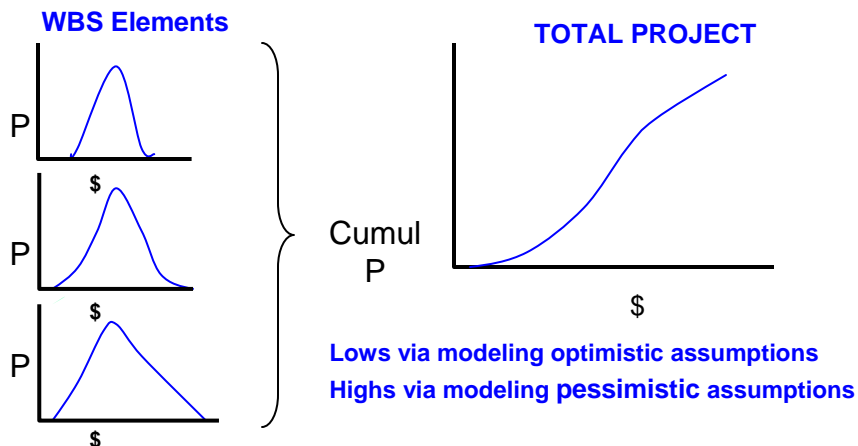
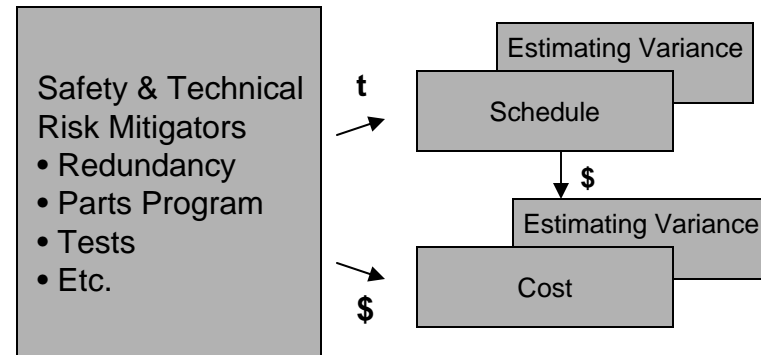


# Cost Risk Analysis

## Risk Areas

- Safety
- Technical/Performance/Engineering
- Schedule
- Cost

## “Dollarizing” Risks



- All cost estimates are really probability distributions
  - Variance narrows as project life cycle proceeds
- Sources of uncertainty
  - Uncertainties in project definition (“known unknowns”)
  - Cost model statistical variance
- Cost risk analysis quantifies budget reserves necessary for acceptable level of confidence



# Cost Analysis Data Requirement (CADRe)

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- CADRe is a Data Requirement on new high dollar value flight projects (“Cat I and Cat II” in NPR 7120.5C vernacular)
  - Some PMs have expressed an interest in using CADRe for smaller missions as well
- DoD has had a similar approach in place for many years
  - CARs (Cost Analysis Requirement Description)
  - CDRs (Contractor Cost Data Report)
  - Typically voluminous
- NASA approach
  - CADRe: A single Data Requirement combining DoD’s CAR and CDR concepts
  - Streamlined (focused on cost drivers and related information)
  - Collects data at key milestones from Phase A to E
  - Includes the project’s Life-Cycle Cost Estimate that corresponds to CADRe description
    - Configuration control for the cost estimate



# One NASA Cost Engineering (ONCE) Database

